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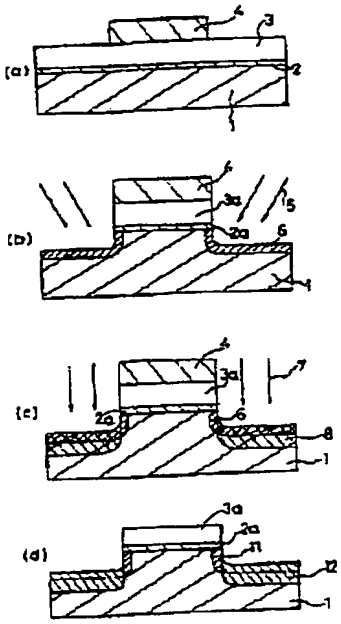
TITLE : SEMICONDUCTOR DEVICE AND MANUFACTURE THEREOF



ABSTRACT : PURPOSE: To improve controllabilty of the shape of a gate electrode, by forming a dug part of a semiconductor substrate in a self-alignment manner with an upper gate electrode, forming a diffusion layer of low impurity concentration on the side surface of the substrate dug vertically to the semiconductor substrate, and forming a diffusion layer of high impurity concentration on the bottom surface of the dug substrate.

CONSTITUTION: Phosphorus ions as impurity ions 5 are implanted to be about 1×10^{13}/cm, obliquely to the main surface of a substrate 1. Thereby a region 6 of low impurity concentration region is fomed the side wall and the bottom of the dug substrate 1 to the inside of the substrate 1. The depth of the region 6 is about 0.1μm, and the impurity concentration is about 10^{18}-10^{19}cm^{-13}.
Phosphorus ions as impurity ions 7 are implanted to be about 6×10^{15}/cm, vertically to the main surface of the substrate 1. Thereby a region 8 of high impurity concentration is formed from the bottom of the dug substrate 1 to the inside of the substrate. The depth of the region 8 is 0.3μm, and the impurity concentration is 1-2×10^{20}/cm^{-3}. Hence controllabity of the shapr of a gate elecxtrode is excellent, and resistance value of the gate electrode is not increased.